NON-PUBLIC?: N
ACCESSION #: 8909150357
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Oconee Nuclear Station, Unit 1 PAGE: 1 OF 08

DOCKET NUMBER: 05000269

TITLE: A Reactor Trip Occurred Due To An Inappropriate Action While Resetting Reactor Protective System Trip Setpoints
EVENT DATE: 08/10/89 LER #: 89-013-00 REPORT DATE: 09/11/89

OPERATING MODE: N POWER LEVEL: 040

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Henry R. Lowery, TELEPHONE: (803) 885-3034
Chairman Oconee Safety Review Group

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On August 10, 1989, at 1541 hours, Unit 1 tripped due to an inadvertently induced Reactor Protective System (RPS) actuation. At the time of the trip, Unit 1 was at 40% Full Power due to a previous power reduction to add oil to the 1A2 Reactor Coolant Pump motor. During this reduced power operation with three pumps, the steady state quadrant power tilt limit was exceeded in one core quadrant. As required by Technical Specifications, actions were initiated to both reduce the quadrant power tilt within limits and to reduce the overpower trip setpoints based on flux and flux/flow/imbalance. While performing the procedure to lower the overpower trip setpoints, an Instrumentation and Electrical technician incorrectly positioned a flow test circuit selector switch. Since another RPS channel was tripped per procedure, a reactor trip was initiated when the channel was returned to service with the incorrectly positioned switch. The root cause of this event is classified as Inappropriate Action, failure to follow procedure. The immediate corrective action was to stabilize the unit at hot shutdown conditions.

END OF ABSTRACT

BACKGROUND

The Reactor Protective System (RPS) EIIS:JC! monitors parameters related to the safe operation of the plant. The RPS protects the core against fuel clad damage and protects the Reactor Coolant System EIIS:AB! against damage caused by high system pressure. This system utilizes reactor trip module relays in four identical protective channels to provide reactor EIIS:RCT! trip signals for de-energizing the six control rod drive EIIS:AA! trip breakers. The RPS provides a two out of four logic for tripping the reactor in the event that a predetermined safety setpoint is exceeded.

A dummy bistable is used to bypass one of the normal bistable trip parameters associated with an RPS channel. It is essentially a "hard wire" across a RPS bistable which prevents that bistable from tripping. The use of a dummy bistable makes that protective function inoperable and therefore makes the entire RPS channel inoperable. At the time of this incident RPS channel 'A' contained a dummy bistable in the flux/flow/imbalance module.

Manual bypass is a keyswitch in each RPS channel that bypasses all trip functions of that channel. This is used for testing individual RPS channels during operation and makes that RPS channel inoperable. In accordance with Technical Specifications (T.S.), only one RPS channel may be placed in manual bypass or contain a dummy bistable at any given time.

Quadrant Power Tilt is defined by the following equation and is expressed in percent.

Quadrant Tilt = 100 x (Power in any core quadrant)
------------------------- -1
(Average power of all quadrants)

T.S. 3.5.2.4 (b) states the two corrective actions to be implemented when the steady state quadrant power tilt limit is exceeded. These actions are: 1) reduce the quadrant power tilt within 2 hours to within its steady state limit or, 2) lower the overpower trip setpoints based on flux and flux/flow/imbalance within 4 hours by 2% thermal power for every 1% quadrant tilt in excess of the steady state limit.

EVENT DESCRIPTION

On August 10, 1989, at 0726 hours, with Unit 1 at 100% Full Power (FP), a control room annunciator alarmed indicating that 1A2 Reactor Coolant Pump

(RCP) motor EIIS:MTR! had a low oil pot level (see attached sequence of events). Using backup indications, it was determined that the lower oil

pot level was low and a power reduction was initiated to secure the pump. At 0957 hours, with the unit at 68% FP, the 1A2 RCP was secured and preparation was made to add oil to the pump motor.

At 1200 hours, during the reduced power operation with three RCPs operating, Control Room Operators discovered while preforming PT/1/A/600/01, "Periodic Instrument Surveillance," that the steady state quadrant power tilt limit had been exceeded. As required by PT/1/A/600/01, immediate corrective actions were taken by the Operators in accordance with Technical Specification (T.S.) 3.5.2.4 to reduce the steady state quadrant power tilt to within limits. These actions included varying the feedwater (FDW) EIIS:SJ! flows to the steam generators EIIS:SG! to produce a difference in the A and B side cold leg temperatures so that the moderator temperature coefficient would affect the flux profiles. Work Request 93200C was also written for Instrumentation and Electrical (I&E) personnel to reset the overpower trip setpoints when it was foreseen that the efforts to reduce the tilt by varying FDW flows were inadequate.

During the time while efforts were being made to reduce the tilt, reactor power was further reduced to 40% FP. This was done to reduce the radiation exposure to personnel during the oil addition to the RCP motor and to be below the power level interlock associated with starting the fourth RCP. When the 1A2 RCP was restarted following the oil addition, it was expected that the quadrant power tilt would begin to return to within limits. However, due to the time limit associated with T.S. 3.5.2.4, I&E was requested to continue with efforts to reset the overpower trip setpoints because there was only 2 hours left before the T.S. time limit expired.

At approximately 1430 hours, I&E technician 'A' was contacted to perform procedure IP/O/A/301/3U, "Procedure to Reset the Flux/Flow/Imbalance and High Flux Trips for Operation with Excessive Power Tilt or Other Conditions." Prior to being contacted, I&E technician 'A' had been working on chart recorders in the control room. Due to the fact that there were no other qualified I&E personnel available, technician 'A' was pulled from his assigned duties to perform this procedure. At 1510 hours, I&E technician 'A' along with technicians 'B' and 'C', who were not experienced on RPS procedures, began IP/O/A/301/3U for RPS channel 'A'. At this time, there was only 50 minutes left in the time limit associated with T.S. 3.5.2.4. Since RPS channel 'A' contained a dummy bistable and was technically inoperable, it was placed in the tripped state as required by the procedure in preparation for resetting the overpower trip setpoints in the other three channels.

Later within this procedure, RPS channel 'C' was placed in manual bypass in preparation for resetting the overpower trip setpoints associated with that channel. As part of this procedure, many steps require selector switches and toggle switches to be repositioned. While performing step 10.3.32 in RPS channel 'C', I&E technician 'A' inadvertently placed a flow test circuit switch in the 'test operate' position instead of the required 'operate' position. The technician then failed to properly perform step 10.3.45 which verified that all test modules were in the 'operate' position. He also did not notice any of the other indications which would have alerted him that RPS channel 'C' was still in the tripped mode prior to removing the channel from manual bypass. At 1541 hours, I&E technician 'A' took RPS channel 'C' out of manual bypass and a reactor trip was initiated from the RPS. The RPS trip logic was satisfied because channel 'A' was currently in a tripped state when channel 'C' was placed in service while still in the 'test operate' mode thus tripping that channel. This satisfied the two out of four channel trip logic necessary for an RPS actuation.

Following the reactor trip, the unit was stabilized at hot shutdown conditions. All control rod drive EIIS:AA! breakers opened satisfactorily and all control rods fully inserted into the core. The Main Feedwater EIIS:SJ! pumps did not trip and consequently, no activation of the Emergency Feedwater System EIIS:BA! was incurred. In general, the post plant response was as expected. The average Reactor Coolant System (RCS) EIIS:AB! temperature stabilized at about 555 degrees Fahrenheit. RCS pressure which was approximately 2150 psig prior to the trip, ranged from approximately 2000 psig to 2200 psig during the post trip transient. Pressurizer EIIS:PZR! level decreased from approximately 220 inches prior to the trip, to a post trip level of approximately 120 inches. Steam Generator (SG) EIIS:SG! levels were maintained at approximately 25 inches after the trip. SG pressures varied up to 1030 psig and 1045 psig for the '1A' and the '1B' steam generators respectively. Turbine header pressure was manually lowered to appr
ximately 970 psig to reseat Main Steam EIIS:SB! Relief Valves 1MS-8 and 1MS-16.

CONCLUSION

The root cause of this event is classified as Inappropriate Action, failure to follow procedure. The Instrumentation and Electrical (I&E) technician failed to follow instructions as outlined in step 10.3.32 of IP/O/A/301/3U. The step stated, "Return switch on flow channel test circuit to 'operate' position." When the I&E technician performed this step, he inadvertently positioned the switch to the 'test operate' position. Afterwards, when he

performed step 10.3.45, he again failed to follow the procedure to ensure that all test modules were in the operate

position. Therefore, when Reactor Protective System (RPS) channel 'C' was removed from manual bypass, a reactor trip occurred due to satisfying the criterion for RPS actuation. It should be noted that the hurried nature in which this work was being performed, due to the expiring time limit associated with the Technical Specification, may have contributed to this incident. Other additional factors which are considered to have contributed to the human performance problem associated with this event are that I&E technician 'A' was: 1) working with two unqualified technicians, 2) pulled from a previous job assignment, 3) performing a procedure which is done infrequently, 4) engaged in work on a control panel which had been poorly designed from a human factors standpoint, and 5) working on a RPS procedure while a dummy bistable was installed in one channel.

It is further concluded that a contributing cause to this incident is a defective procedure. The procedure used did not give clear and concise guidance to the technician on alternate indications that were available to verify that the channel was in a position to be returned to normal. The procedure had no sign-off steps or independent verification steps to document that any indications were monitored prior to removing the RPS channel from manual bypass. The procedure did not provide any additional guidance or controls for performing this procedure when dummy bistables were installed even though the risk of an inadvertent trip was significantly higher.

A review of the station incidents occurring during the past year revealed one other reactor trip due to personnel error while performing I&E procedures related to the RPS (reference Licensee Event Report (LER) 269/89-01). Therefore, this incident is classified as recurring. A review of the corrective actions from LER 269/89-01 revealed that those corrective actions could not have prevented this event. However, it was determined that those corrective actions were not broad enough in scope to prevent this event. No radioactive material releases, radiation exposures, or personnel injuries occurred as a result of this incident. The health and safety of the public were not compromised. This incident did not involve any component failure; therefore, it is not NPRDS reportable.

CORRECTIVE ACTIONS

Immediate

1. The unit was stabilized at hot shutdown conditions.

Subsequent

1. The Instrumentation and Electrical (I&E) technicians involved in the incident received counseling on the necessity to follow written instructions per Station Directive 2.2.1.

2. The unit was returned to 100% Full Power.

Planned

1. I&E will review and revise IP/O/A/301/3U, "Procedure to Reset the Flux/Imbalance/Flow and High Flux Trips for Operation with Excessive Power Tilt or Other Conditions", to incorporate steps necessary to verify that all available indications are properly checked and documented to ensure that Reactor Protective System (RPS) channels are ready to be returned to service.

2. I&E will review and revise as necessary all procedures related to the RPS to determine if other similar problems exist with insufficient instructional guidance to ensure proper task completion.

3. I&E will train and qualify additional technicians on IP/O/A/301/3U.

SAFETY ANALYSIS

Following the reactor trip, the unit was safely stabilized at hot shutdown. Emergency Feedwater was not activated and the Integrated Control System responded properly. The Operators safely controlled the unit following the trip. No actuation of Engineered Safeguards systems or Pressurizer relief valves occurred, and no Reactor Coolant System leakage was induced as a result of this trip. While a Reactor Protective System actuation was the cause of this trip, there were no reductions in the ability of the normal plant systems, or of the plant emergency systems, or of Operations personnel to safely control the plant since this was an expected response. The trip response did not degrade plant performance and no safety concerns were generated. The health and safety of the public were not affected as a result of this event.

SEQUENCE OF EVENTS

Date/Time Description

07:26 Received 1A2 Reactor Coolant Pump (RCP) low oil pot level alarm

07:42 Power reduction commenced to secure 1A2 RCP

09:57 1A2 RCP secured at 68% full power

12:00 Quadrant power tilt steady state limit exceeded per PT/1/A/600/01

13:30 Instrumentation and Electrical (I&E) section contacted to prepare to reset overpower trip setpoints

14:00 Operations wrote WR 93200C to reset overpower trip setpoints

14:05 1A2 RCP started after oil addition

14:30 I&E technician pulled from previous job to perform procedure to reset overpower trip setpoints

15:10 IP/O/A/301/3U is started

15:13 I&E technicians discover dummy bistable in Reactor Protective System channel A

15:22 RPS channel A is tripped per procedure

15:24 RPS channel B placed in manual bypass

15:32 RPS channel B taken out of manual bypass after trips reset

15:38 RPS channel C placed in manual bypass

15:39 I&E technician A mispositioned the flow test circuit selector switch in step 10.3.32 of IP/O/A/301/3U

SEQUENCE OF EVENTS

Date/Time Description

15:39 I&E technician A again fails to follow procedural guidance in step 10.3.45

15:41:49 RPS channel C trips due to being returned to service with mispositioned switch

Reactor trip occurs due to satisfying 2 out of 4 RPS trip logic

Control rod drive breakers open

Generator lockout signal received

Generator output breakers opened

Unit 1 main turbine tripped

15:42:02 Reactor coolant letdown isolated (1HP-5 closed)

15:42:54 Reactor coolant loop A injection opened (1HP-26)

15:45:24 Reactor coolant loop A injection closed (1HP-26)

15:46:11 Reactor coolant letdown reestablished (1HP-5 opened)

ATTACHMENT 1 TO 8909150357 PAGE 1 OF 1

Duke Power Company (803) 882-5363
Oconee Nuclear Station
P.O. Box 1439
Seneca, S.C. 29679

DUKE POWER

September 11, 1989

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/89-13

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/89-13 concerning Reactor Trip due to trip of Reactor Protective System.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

M. S. Tuckman
Station Manager

SWB/ftr

Attachment

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